Next Generation Secure Computing Base

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The Past is Prologue

Computer Security 101 – The Standard Model

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- Establish Security Perimeter around Trusted Computing Base (“TCB”) usually during boot
- Authenticate security principals within security perimeter
- Authorize or deny actions based on security principal and access rules naming principal
- Use cryptographic techniques for verifying identity, and protecting integrity and confidentiality of data and rules outside security perimeter

Software acts on our behalf

- Our reliance on software is increasing
- You can't beat software for flexibility and features
- Current OSs are brittle and have enormous TCBs
- Trust relationships are complex, dynamic and ephemeral
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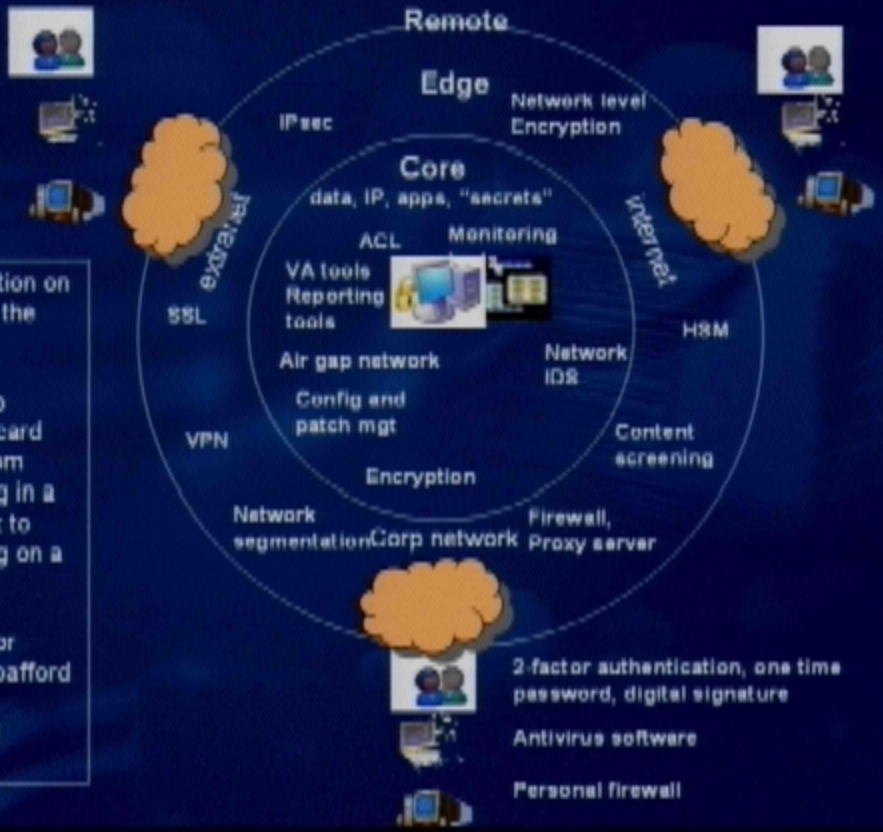
The Modern Problem



"Using encryption on the Internet is the equivalent of arranging an armored car to deliver credit-card information from someone living in a cardboard box to someone living on a park bench."

Professor
Gene Spafford
Perdue
CERIAS

Hobson's Choice

- Either
  - Entire software package established Security
  - Only approved by device manufacturer.

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- Closed System
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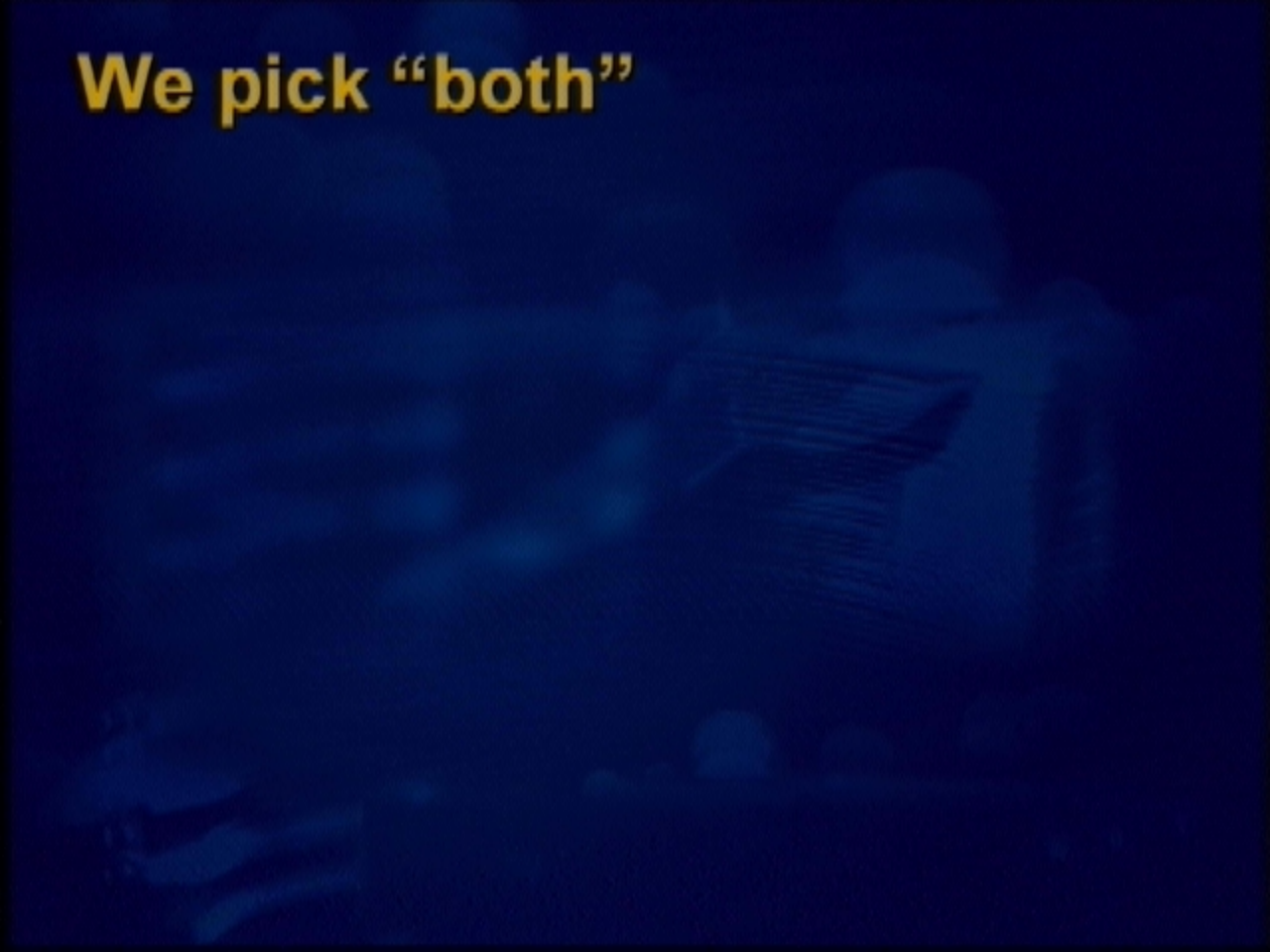
  - Fixed function
  - Small TCB
- Open System
  - General Purpose
  - Big TCB
  - Permeable
  - Lots of flexibility

We pick “both”



We pick “both”

- Trusted Open System
  - Dynamically erected Security Perimeter
  - “Effective TCB” for critical operations is small
  - High security assurance (perimeter integrity, authentication reliability, authorization flexibility)
  - Any OS and any application can run
  - General Purpose
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Next Generation Secure Computing Base

Thanks to MSR: This represents work of MSR and MSR alums including Butler Lampson, John Detreville, Paul and John with help from Dan Simon, MSR Crypto and others at MSR.

Next Generation Secure Computing Base Defined

- Microsoft's Next-Generation Secure Computing Base (NGSCB) is a bad name for a new security technology for the Microsoft Windows platform
  - Uses a unique hardware and software design
  - New kind of security model for integrity, confidentiality and trust negotiation in an interconnected world

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- Provide safe haven in "network rich" environment

Key NGSCB Components

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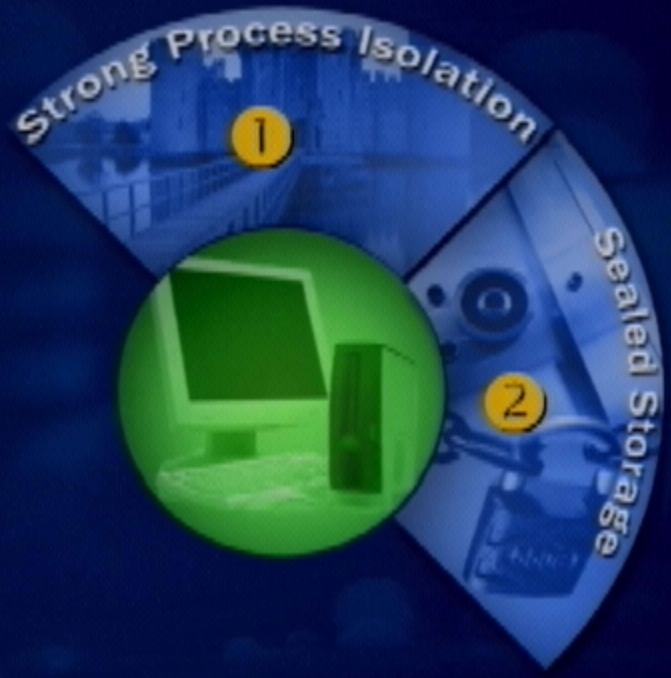

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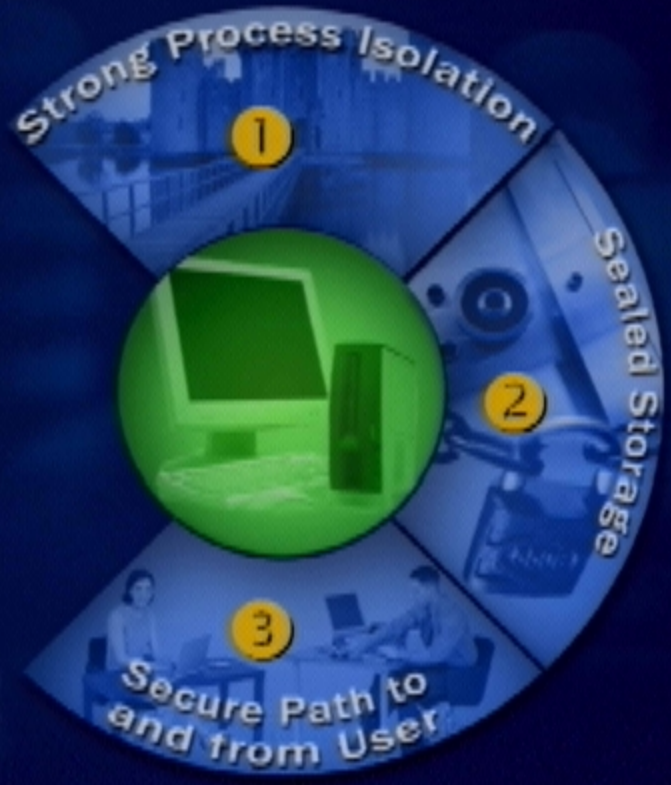

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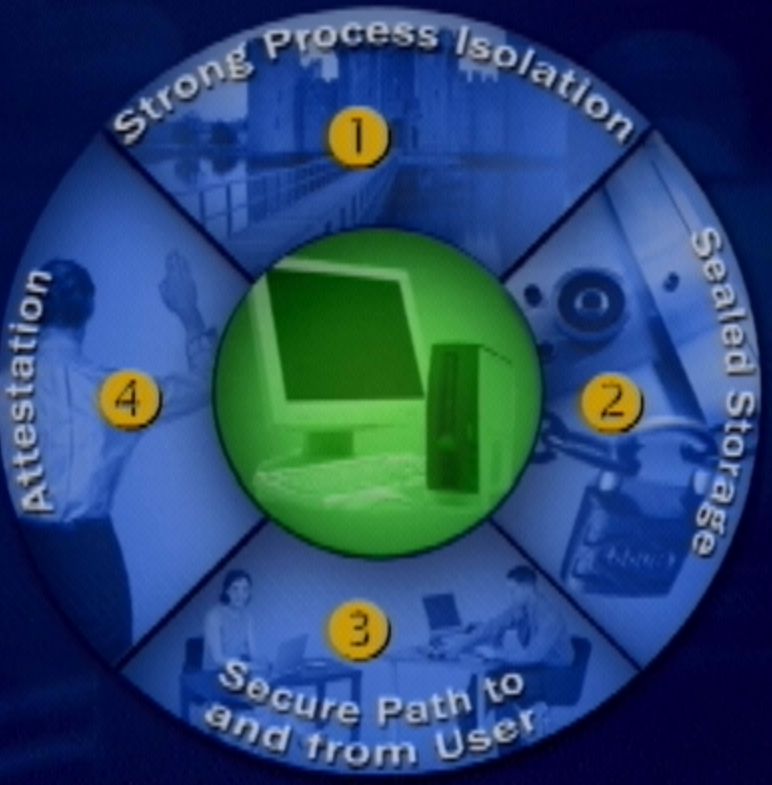
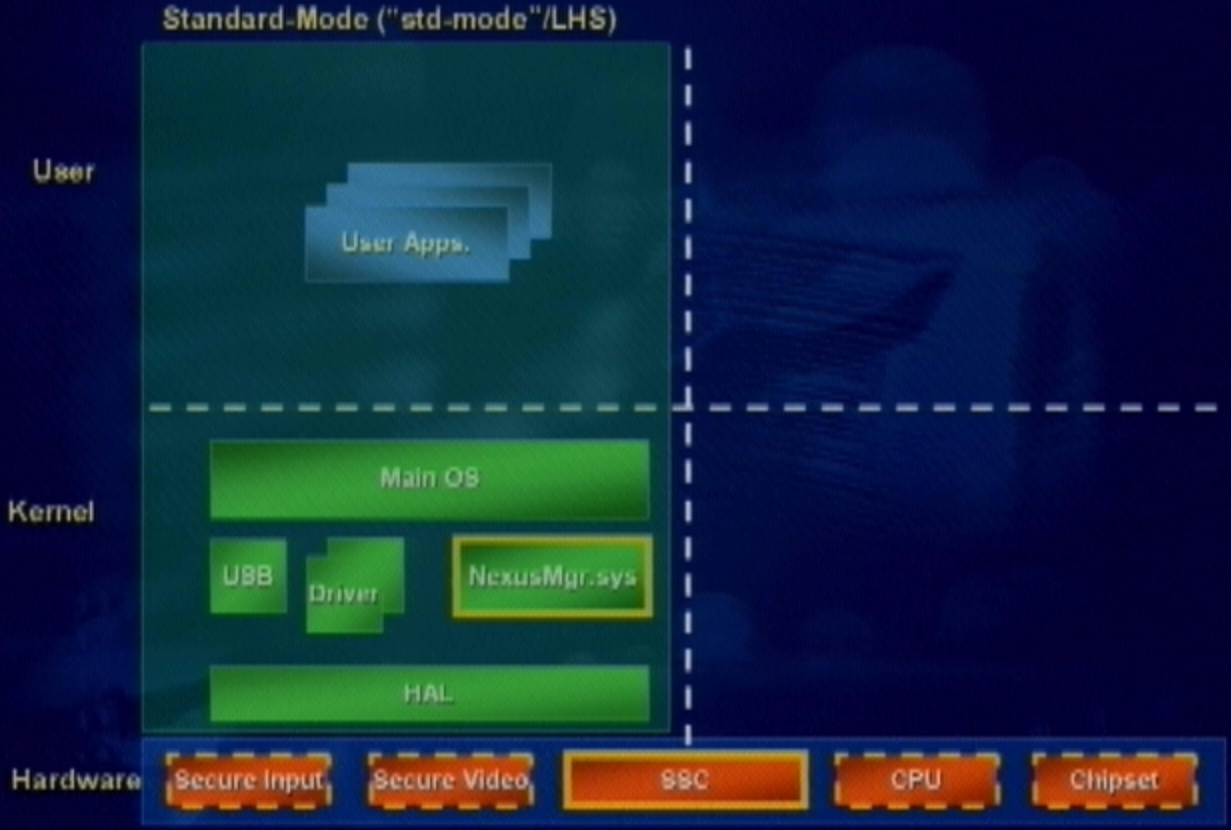


NGSCB Quadrants



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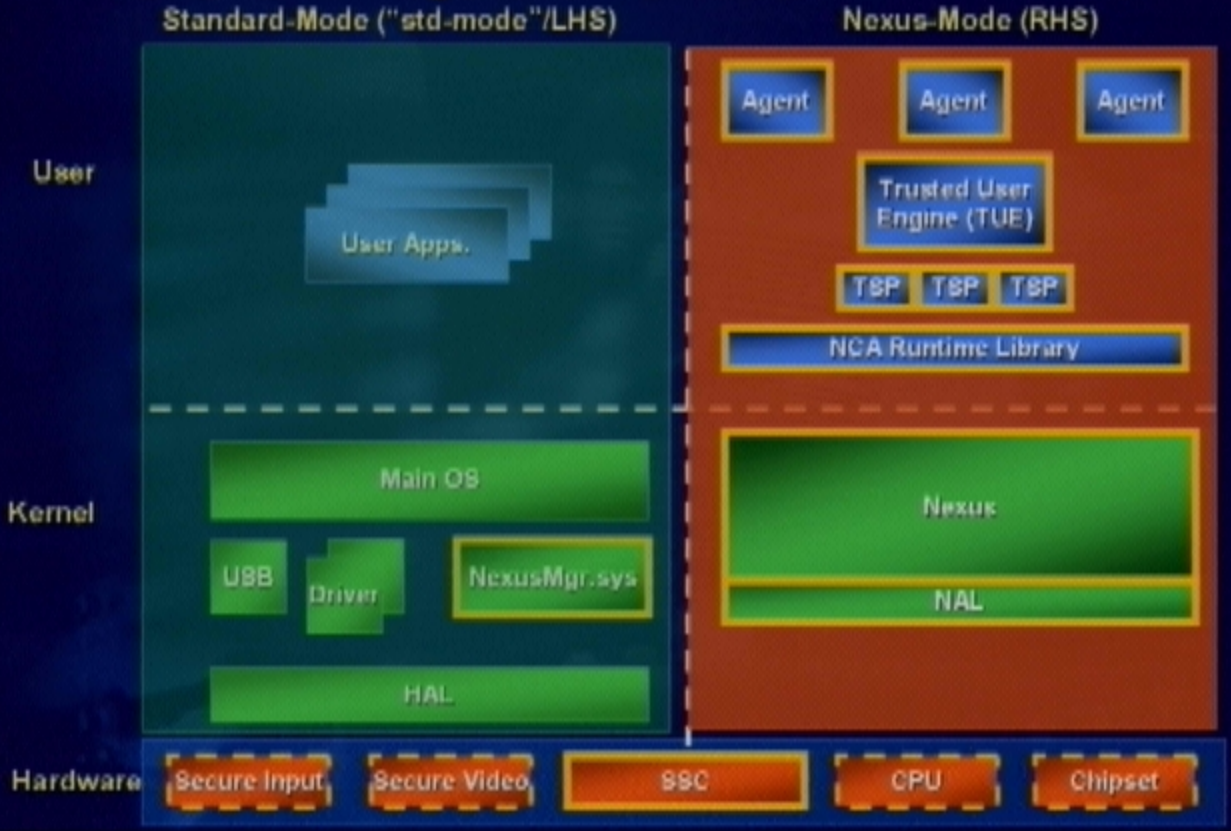

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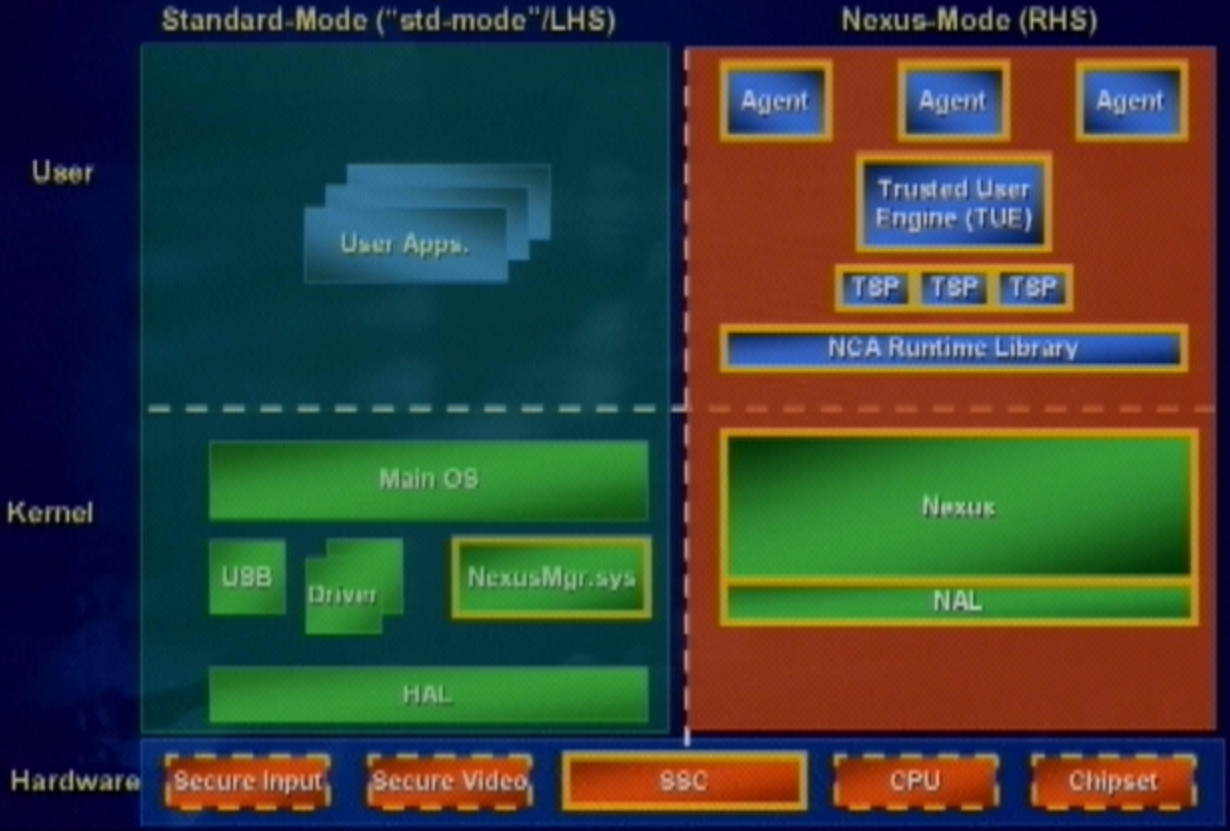

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Attestation Caveat

- Attestation is NOT a judgment of code quality or fitness
  - Code could still be malicious
  - Code could still have bugs affecting security
- Attestation leaves judgment up to challenger
  - Done with high confidence

What Runs On The LHS

- Windows as you know it today
- Applications and Drivers still run
- Viruses too
- Any software with minor exceptions
  - The new hardware (HW) memory controller won't allow certain "bad" behaviors, e.g., code which
    - Puts the CPU into real mode

What the RHS Needs From The LHS

- Memory Management changes to allow nexus to participate in memory pressure and paging decisions
- Window Manager coordination
- IPC, scheduling, communication
- NGSCB management software and services

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- Secure Remote Access
- Secure Network Access
- Secure Machine Policy

- Secure Real Time Messaging
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Secure Machine Policy	• Secure machine monitor • Lock-down and monitor machine policy • Sandbox execution

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- "Small" Rights Management
- "Big" Rights Management
- Secure Collaboration

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Secure Collaboration	• Auctions • Negotiations • On-line Games

NGSCB: Threat Models

- Our Threat Model
  - No Software-Only Attacks Against RHS
  - No Break-Once/Break-Everywhere (BOBE) attacks
- No Software-Only Attacks means…
  - No attacks based on micro-code, macro-code, adapter card scripts, etc.
  - Any attacks launched from the Web or e-mail are "software only"
- Protection only applies to the release of secrets